OPTIMIZE FORAGE QUALITY BY AFTERNOON HARVESTING

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This note is a summary of new research supporting the advantage of afternoon harvesting of forages. It identifies results from plant physiology, animal eating behavior, and lactation research. The note was prepared as a handout for producer meetings. It is cryptic by design. More in-depth information may be obtained by viewing the WEBB PAGE or contacting either author. Many thanks to J.C. Burns, D.S. Fisher, D. Kim, R. J. Orr, V. Owens, and D. Putnam for their contributions to these findings. Photocopies or excerpts of this note are permissible.

- Plants accumulate sugars during the day and use them up at night. This causes a diurnal cycling of forage sugars and overall quality (Fig. 1). Cutting forage during late afternoon captures much of this extra sugar. Consequently, afternoon-cut hay has higher feed value than does morning-cut hay (Mayland et al., 1998 and Fisher et al. 1999).

- Total digestible nutrients are likely higher, crude protein may not be different, but acid detergent fiber and neutral detergent fiber are lower in afternoon than morning cut alfalfa (Putnam et al., 1998).

- Cattle, sheep and goats have a strong preference for afternoon-cut hay compared with morning-cut hay. Animals also eat more afternoon- than morning-cut hay (Fisher et al., 1998 & 1999).

- Dairy cows will eat about 8% more of a total mixed ration (TMR) containing 40% afternoon-cut alfalfa hay than one containing morning-cut alfalfa hay and will produce about 8 % more milk (Kim, 1995). Adjusting schedules to cut hay in afternoon and early evening can increase feed value of hay by 15%. This practice can be adopted without any additional investment.

- Green-chopped alfalfa cut in the afternoon will have more feed value and is relished more by cows than if cut in the morning (Mayland, unpublished).

- When making silage from alfalfa or clover hay, one can enhance the fermentation process by cutting the hay in the afternoon compared to cutting in the morning (Owens, 1996).

- Factors that increase forage quality in the afternoon- vs. morning-cut hay are measurable with current tests for acid detergent fiber (ADF) and neutral detergent fiber (NDF). Afternoon cut grass or legume hays may have an additional 10 to 30 relative feed value (RFV) units than morning-cut hays (Mayland et al_ 1998).

- Grazing animals eat more grass and clover in afternoon than morning. Animal behavior is related to increases in soluble carbohydrates (Orr et al., 1997).

- Dairy cows foraging pastures under 24-h strip grazing management produced 8% more milk when the fence was moved at 4 pm vs 6 am. (Orr et al., 1998).

- Increased sugars in afternoon forage may explain increased bite counts in afternoon vs morning grazing.

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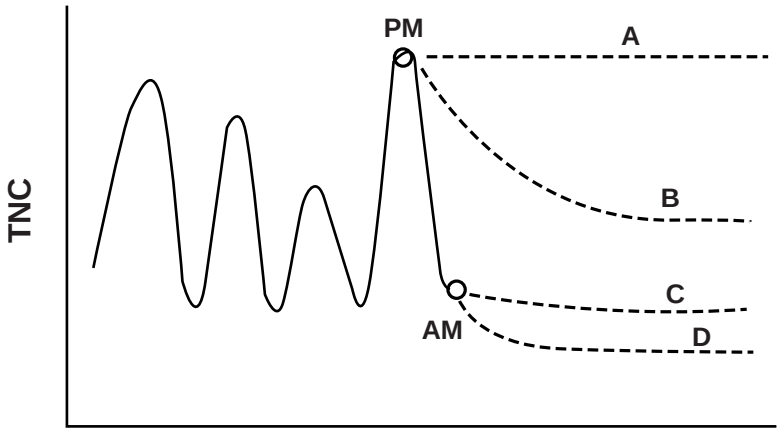

Figure 1. Example of diurnal cycling of sugar levels in green forages showing higher concentrations in mid- to late afternoon. Cutting in afternoon captures these higher levels. Rapid drying of hay preserves more sugars (A/C) than will slow drying (B/D).

Table 1. Intake and composition of alfalfa hays used in preference experiment with cattle.

Hay Harvest	ADF	NDF	TNC	Intake
	Percent			g/meal
Afternoon - 8 July	31.1	40.7	4.29	1022
Morning - 9 July	32.8	42.7	3.49	842
Afternoon - 14 Aug	32.0	41.9	5.16	619
Morning - 15 Aug	32.5	42.0	3.97	324
Afternoon - 22 Sept	27.9	36.6	6.55	1320
Morning - 23 Sept	28.5	37.2	5.46	1107
Afternoon average	30.3	39.7	5.33	987
Morning average	31.2	40.6	4.31	758

Technical References

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